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GEOLOGY AND PALÆONTOLOGY.

A NEW OPISTHOCŒLOUS DINOSAUR.—I have recently received from the Dakota beds of Canyon city, Colorado, a number of bones of a new and remarkable extinct reptile allied to *Camarasaurus* (= *Titanosaurus* and *Atlantosaurus* Marsh nom. nud.), and *Streptospondylus*. The dorsal vertebræ are strongly opisthocœlous, and are without lateral fossa or foramen of the centrum. The arch is freely articulated with the latter, and is not much elevated, and possesses no hyposphen. The neural spine is transverse; the diapophysis is supported on narrow buttresses, and the neural arches generally lightened by fossæ as in the two genera named. A strong parapophysial tubercle near the anterior convexity receives the head of the rib. Each zygapophysis of one side is separated from that of the other by a deep concavity. The genus so characterized may be called *Epanterias*, and the species *E. amplexus*. The latter has a rather low and wide dorsal neural arch with small fore and aft diameter, and with a neural spine divided into three obtuse apices. There are three fossæ at the base of the diapophysis, the anterior one vertical; and a very deep one between the posterior zygapophyses. The cup of the centrum embraces the ball extensively, and the neurapophysis overlaps the side of the centrum behind. Length of centrum m. .115; diameters behind, transverse, .120; vertical .108. Elevation of neural arch .290; width of neural spine .083, of both diapophyses .400. This saurian was much smaller than the *Camarasaurus supremus*, and perhaps equal to the *Hadrosaurus foulkei*. It may be associated with the former in the *Camarasauridae*. With *Amphicœlias* is probably in like manner to be arranged *Tichosteus*; while the carnivorous form *Hypsirhophus* represents a third type.—*E. D. Cope*.

PROF. MARSH ON PERMIAN REPTILES.—In the May number of the *American Journal of Science and Arts*, there is an appendix added by Prof. O. C. Marsh, in which he characterizes in a very insufficient manner, four species of reptiles, which he states to have been derived from a Permian formation in New Mexico. We should not regard this article as suitable for notice in this journal but for certain assertions which it contains, and some circumstances connected with its publication. In the opening paragraph it is asserted that "hitherto no Permian vertebrates have been identified in this country, although not uncommon in Europe." This statement is the reverse of the fact. In the Proceedings of the Philadelphia Academy for 1875, p. 404, a paper on this type of vertebrates commences, where some of the leading characters of the reptiles are pointed out. In the Proceedings of the American Philosophical Society for May, 1877, several new species are described from the same formation, and in the same journal for November, 1877, other species are added, making the whole number up to twenty-one. These

papers Prof. Marsh has had the opportunity of seeing. Two further notices of the vertebrates of the American Permian appeared on April 22d of the present year, in the May number of this journal, pp. 319, 327. As the corresponding number of the *Amer. Jour. Sci. and Arts* was not issued before May 5th (perhaps a day or two sooner), Prof. Marsh had the opportunity of seeing these also. They include references to seven new genera, for most of which the characters are clearly pointed out.

The features common to the genera of the Permian, described by Marsh, are stated by him to be those characteristic of the order *Rhynchocephalia*; as I have already shown to be the case with the forms described by me in the earliest as well as later papers of those cited. Another characteristic is said to be the presence of the intercentrum, a statement agreeing with my own in the May number of this journal. It is also observed that there is a double tubercular rib-articulation of the centra, a structure I have already described in the genus *Diplocaulus*.¹ Prof. Marsh's statement that the mode of implantation of the teeth is similar to that of the "*Mosasuria*" is probably incorrect.

As the author of the paper does not think it necessary to allude to published sources of information, it is too much to expect him to give credit for ideas communicated to him verbally. All of the above mentioned, and additional characters cited by Marsh in his two opening paragraphs² (l. c. 409) as belonging to the Permian Reptiles, with others, were explained by me before the National Academy of Sciences, with Prof. Marsh as an attentive listener, at its last meeting in Washington, April 18th, more than two weeks before the appearance of the paper here criticized. The characters to which I refer are "the separate premaxillaries, the immovable quadrate, and the biconcave vertebræ;" the "hypaxial elements of the vertebræ called by [von Meyer] intercentral bones." "These intercentral ossifications apparently exist in all the Reptilia yet found in this new fauna." Compare these statements with those found in my paper read before the National Academy (which had been previously read before the American Philos. Society, April 5th) and published May 8th. That Prof. Marsh profited by what he heard, is evidenced by his use of the term "intercentra," first introduced by myself. From this point of view it is easy to understand his attempt to make it appear that Meyer first used the word. He says, "Another character of much interest is the presence of certain hypaxial elements of the vertebræ, first observed by von Meyer in the Triassic genus *Sphenosaurus*,³ and called by him intercentral bones ('*Zwischenwirbelbein*')" (sic). As *Zwischenwirbelbein* does not mean intercentrum, but *interver-*

¹ Proceed. Amer. Philos. Soc. 1877, p. 187.

² Except that mentioned previously under *Diplocaulus*.

³ Which I referred to the *Rhynchocephalia* in 1870; see Proceed. Am. Ass. Adv. Sci. xix, p. 242.

tebral bone, Prof. Marsh's knowledge of the former term must be ascribed to some other source. The fact that the Amer. Journ. Sci. Arts appeared a good deal later than its usual date of publication, may be considered in this connection.—*E. D. Cope*.

FOSSORIAL REPTILES.—Prof. Cope has recently described some reptiles from the Permian formation in which the humeri possess many of the characters of those of the mole and other fossorial *Mammalia* in the great development of the muscular insertions and epicondyles, and the presence of a supracondylar foramen. They are referred to five species of three genera of *Pelycosauria*, a tribe of the order *Rhynchocephalia*.

GEOGRAPHY AND TRAVELS.

RICHTHOFEN'S CHINA.¹—The portion of this great work relating to the loess, so wonderfully developed in parts of China, was noticed, at some length, by Prof. Whitney in the December number of this journal. We will merely run through the table of contents, to show the breadth of the researches made by the learned author, so well known in this country for his investigations in the geology of California. The general features of China and Central Asia, the loess formation in Northern China, the structure and formation of the salt steppes of Central Asia are discussed at length. This portion is followed by chapters on the transition region of Central Asia, on the distribution of desert and loess-covered regions in other parts of the earth; the plateaux of Central Asia, embracing the Tiën-shan, Kwen-lun and the mountainous regions in Southern Asia. The second part relates to the development of our geographical and historical knowledge of China. The wood-cuts are in many cases full-page illustrations and, with the maps and general elegance of the typography and paper, in addition to the text, render the work of a high order of interest.

THE BIG HORN CAÑON.—Gen. Brisbin has given an interesting account of the Powder river country, extending from the sources of the Big Horn and Powder rivers over the Big Horn mountains and the plains as far as the Missouri river, a country unknown to white men until 1866. "It contains," says Judge Daly in his recent address to the American Geographical Society, "one of the greatest natural curiosities of our continent, the Big Horn Cañon, which rivals the famous gorge of the Colorado."

THE ISTHMUS OF DARIEN.—A valuable map and notice of recent surveys, especially those of Lieut. L. N. B. Wyse in 1876

¹ *China. Ergebnisse eigener Reisen, und darauf gegründeter Studien.* Von F. T. VON RICHTHOFEN. Eister Band. Einleitender Thiel. Mit 29 wood-cuts and 11 maps. Berlin. D. Reimer. 1877. 4to, pp. 758.